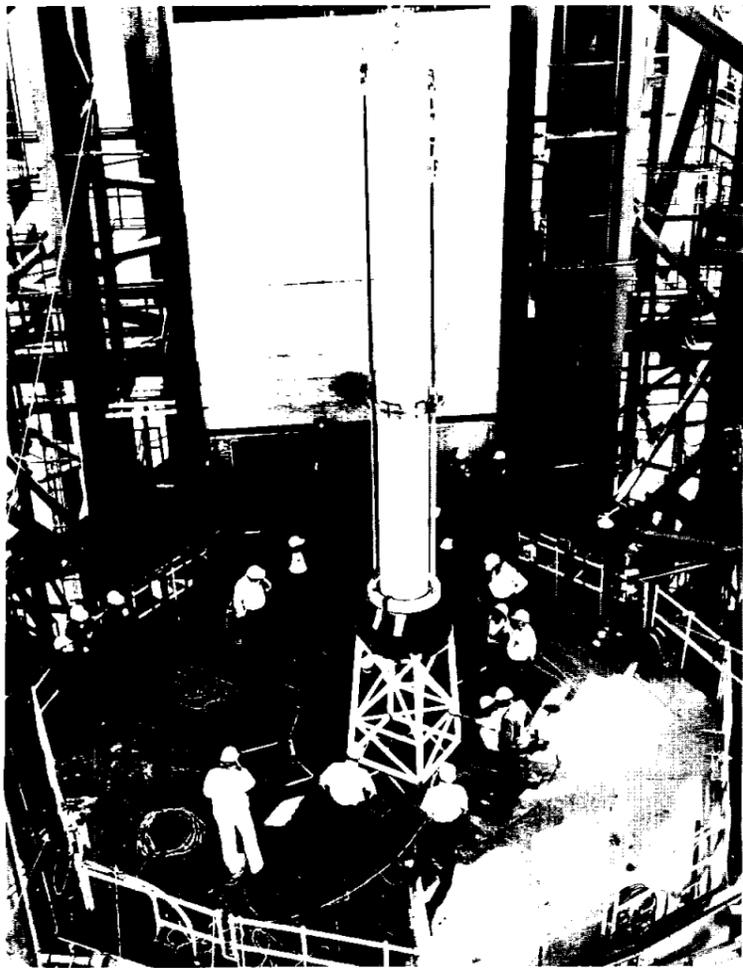


Space News **ROUNDDUP!**

Two Apollo Boilerplates On Pads Awaiting Launch



ESCAPE MOTOR-TOWER FOR BP-13---Workmen mate the Launch Escape System to the Apollo boilerplate command module as it sits atop the Saturn I launch vehicle on Pad 37B at Cape Kennedy, Fla.

Apollo boilerplate spacecrafts 12 and 13 stand on pads in New Mexico and Florida, nearly 2000 miles apart awaiting final checkout of launch vehicles and spacecraft test components prior to launch dates sometime next month.

The White Sands Missile Range, N. M., launch will be the first full-scale test flight of the Apollo spacecraft launch escape system.

A Little Joe II, solid fuel launch vehicle will boost the Boilerplate-12 command and service module with a live launch escape system to an altitude of approximately 20,000 feet. At this point the thrust of the vehicle's solid-fuel Algol motor will be terminated by activating two linear-shaped charges attached to the motor casings.

When the Little Joe's thrust is terminated the spacecraft's launch escape motor will pull it away from the vehicle, the escape tower will be jettisoned, and the spacecraft will parachute to earth.

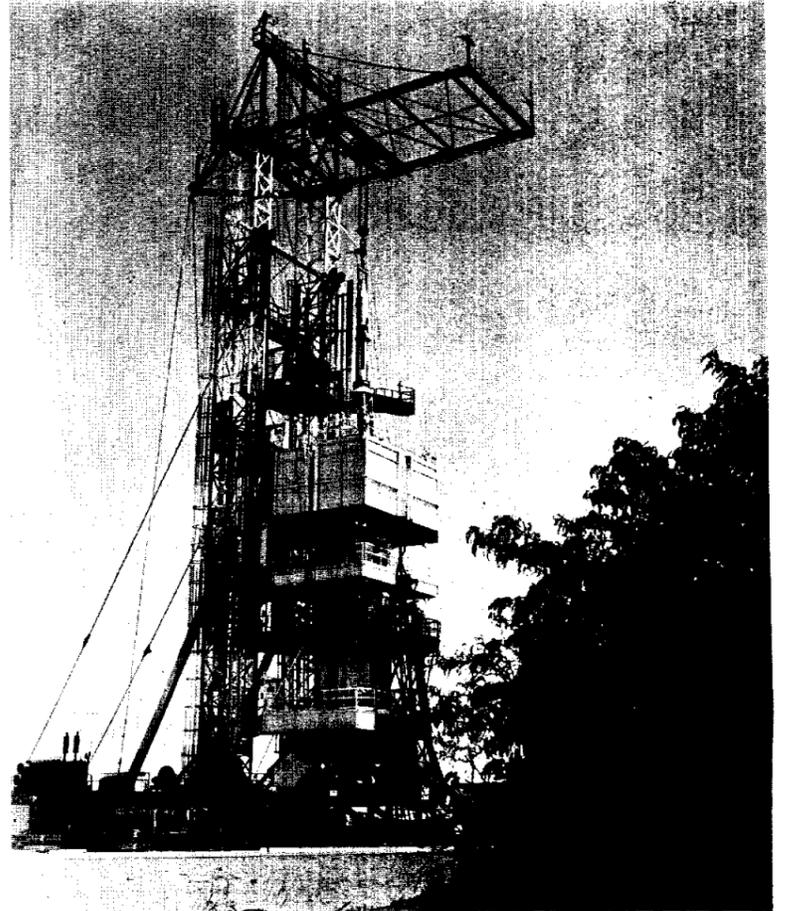
A successful pad abort test of the Apollo spacecraft escape system was conducted at White Sands Missile Range last November.

The flight scheduled for next month in New Mexico is one of a series to develop and qualify the escape system before manned Apollo flights.

Launching of Boilerplate-13 command and dummy service module and lunar excursion module fairing in Florida will set a milestone when the giant Saturn launch vehicle lofts the first Apollo systems into an earth orbit.

The orbital test flight, scheduled for next month, will demonstrate the primary mode of the launch escape tower jettison, using the escape tower jettison motor; determine the launch and exit environment parameters; demonstrate the physical compatibility of the Saturn I launch vehicle and the Apollo spacecraft under pre-flight and flight conditions; and qualify the Saturn I launch vehicle.

The 190 feet tall Apollo/Saturn I vehicle will be launched from Cape Kennedy with a lift-off weight of over 580 tons and a thrust of approximately 1,500,000



READY FOR LAUNCH---The Little Joe II launch vehicle with the Apollo Boilerplate-12 spacecraft and launch escape system stacked atop it stands on the pad at the White Sands Missile Range in New Mexico awaiting launch.

REPORTING TIMES STAGGERED

New MSC Working Hours Effective May 10, 1964

To alleviate the traffic congestion and parking problems in and around the Clear Lake site, staggered hours of duty are being established at the Manned Spacecraft Center effective May 10, 1964, it was announced by Dr. Robert R. Gilruth, director.

Employees working in Buildings One and Two at the Clear Lake site will have daily working hours from 8:15 a.m. to 4:45 p.m., with 30 minutes for lunch.

Employees working in all other buildings at the Center and at locations other than the Clear Lake site, the working hours will be 7:45 a.m. to 4:15 p.m. daily, with 30 minutes for lunch.

This schedule applies to all MSC employees stationed in the Houston area, regardless of whether or not they are being moved to the Clear Lake site at this time.

It is expected that for various reasons some exceptions to the standard tours of duty will be required. These will be processed on an individual basis, and prior approval obtained in accordance with MSC Management Manual 17-10-2.

Special tours of duty previously established are not affected by this announcement and will remain in effect unless subsequently cancelled or superseded by a different special tour.

Book On Space Technologies Authored By MSC Engineers

Forty four engineers and technical authors assigned to the NASA Manned Spacecraft Center are collaborating with Fairchild Publications, Inc., of New York in the publication of a new book that outlines latest technologies involved in the race for the moon.

Title of the book will be "Engineering Design and Operation of Manned Spacecraft." The authors are men who have been closely associated with all of the U.S. efforts in manned space flight to date.

They are engineers whose energies and genius produced the vehicles which carried the first Americans into space and brought them back safely during the Mercury Program.

The editors, who are organizing and coordinating the material are: Paul E.

Purser, Special Assistant to the Director of NASA's Manned Spacecraft Center, Maxime A. Faget, Assistant Director for Engineering and Development at MSC, and, Norman F. Smith, Technical Assistant to Faget.

All three editors have been associated with the government's research and development work in this area for close to 20 years. They were attached to the National Advisory Committee for Aeronautics (NASA's predecessor) when American aviation first moved into the era of supersonic flight and rockets.

Purser and Faget have made many notable contributions to space technology and spacecraft design. They first worked together

(Continued on page 3)

(Continued on page 3)

'Center Probe And Drogue' Technique Will Be Lunar Rendezvous Method

A space maneuver called the "center probe and drogue" technique, patterned after aircraft inflight refueling, will be used by Apollo astronauts to rendezvous their two spacecraft modules in lunar orbit.

The Apollo lunar docking technique is being developed for NASA's Manned Spacecraft Center, by engineers at North American's Space and Information

Systems Division.

The rendezvous is scheduled to occur when two astronauts leave the moon aboard the lunar excursion module (LEM) to rejoin the third astronaut orbiting in

the Apollo command module some 80 nautical miles above the lunar surface. The LEM astronaut will fire the engine at a computed time when the command module is nearly overhead.

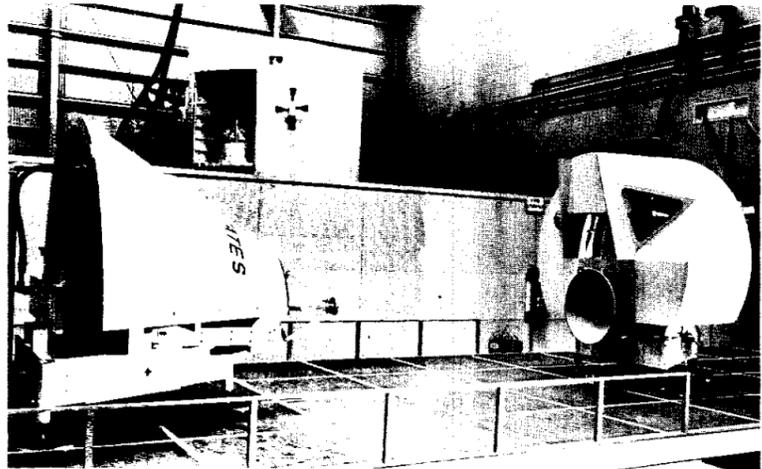
Using its ascent engine, the Lunar Excursion Module will leave the moon's surface and climb the curving course to intercept the orbiting command module.

Taking a bead through his rendezvous docking window, the pilot-astronaut will visually line up the LEM with the spacecraft and the two will be joined together.

A probe on the command module enters a drogue (conical funnel) on the LEM. The probe aligns the two spacecraft and acts like a shock absorber, preventing a hard bump. Automatic latches lock when the two vehicles mate. A passageway between them is pressurized and sealed, then the probe and drogue are removed manually to permit crew transfer. After the two astronauts have re-entered the Apollo spacecraft, the LEM is detached and left in lunar orbit.

During the actual lunar voyage, the spacecraft will be able to move in six directions. Rocket-propellants will replace air motors to power docking operations. From the rendezvous docking window, the astronaut will sight the visual target on the LEM--like lining up a gunsight--to guide the spacecraft to a rigid "center probe and drogue" lockup.

First actual test of the docking maneuver in space will be an earth orbit of a manned Apollo command module and an unmanned LEM.



LUNAR DOCKING--Mockups of Apollo command and lunar excursion modules rehearse space docking technique at North American's Space Division, Downey, Calif. The vehicles were piloted on near friction-free air pads to simulate as much as possible a zero g (weightless) lunar environment. The space maneuver, called the "center probe and drogue" technique, will be used by Apollo astronauts to rendezvous their two spacecraft modules in lunar orbit.

Real-Time Computers Moved Into MCC

The Manned Spacecraft Center moved its first real-time computer system into the Mission Control Center (MCC) at the Clear Lake site early this month.

Consisting of 27 units, the 7094 computer was relocated from leased facilities in Houston. It was built for MSC by the Federal Systems Division of International Business Machines Corporation, Bethesda, Md.

MCC will be the focal point for directing Gemini and Apollo flights after all the electronic equipment is installed. When the new center is finished, space missions will be controlled just as Project Mercury flights were run by Mercury Control at Cape Kennedy, Fla.

Telemetry and communications will emanate from the spacecraft; be picked up by a world-wide network of tracking stations, and relayed to MCC. Computer driven data will be shown and plotted on a huge control panel where a team of flight controllers will make mission decisions.

The information in turn will be transmitted through the tracking network and into the spacecraft.

The control center complex consists of a Missions Operation Wing, Lobby Wing and an Administration Wing. It's three stories high and contains 245,000 square feet of space.

Two mission control rooms are in the window-

less operations wing. The rooms are identical and are required because of the detailed control preparation that will go into missions, frequency and length of flights and the extensive training programs that are essential to success. The two control rooms are located on the second and third floors.

The first floor will contain the major electronic systems needed in space-flight.

MCC directed flights are expected to start in mid-1965.



GET-WELL CARD FOR GLENN--Lt. Col. John H. Glenn Jr., and his wife Annie in their home in Timber Cove, smile approvingly over the receipt of a large get-well card from friends at Cape Kennedy. Glenn said, "This must be the biggest get-well card in history and I can't tell you what a big kick we got out of it. With 771 names on it, we couldn't adequately thank everyone personally."



NASA WINNERS--William E. Stoney Jr., chief, Advanced Spacecraft Technology Division at MSC presents scale models of the Gemini spacecraft and a plaque to winners of a special NASA writing contest held during the Seminar for High School Sciences here at MSC April 18. The winners are (l. to r.) Wilma Addison, Patricia Humphries, Robert Wallis, Lynn Berry, Weldon Baily, Joe Anderson, and William A. Voelkle. (Not shown Beth Kykendall)

Science Seminar Held At MSC, Special NASA Category Included

A Seminar for High School Sciences was held here at Manned Spacecraft Center auditorium, April 18, and a South Houston High senior was named top winner of the fourth annual affair.

Nathan Isgur's research and subsequent report, titled, "Bacterial Identification Through Characteristic Electrophoretic Patterns," won him a trip to Baltimore and also a trophy from the Houston Heart Association.

The Seminar was held at MSC for the first time. More than 125 students participated, reading technical and editorial reports on scientific reports.

First and second place winners were named in four junior and senior catego-

ries and eight winners of a special NASA writing contest were announced.

The NASA winners and their schools:

Senior Editorial--Lynn Berry, Aldine; Robert Wallis, Lamar.

Senior Technical--William A. Voelkle, Sam Houston; Wilma Addison, Kashmere.

Junior Editorial--Beth Kykendall, Rogers; Patricia Humphries, Southmore.

Junior Technical--Weldon Bailey, Aldine; Joe Anderson, Landrum.

SPECIAL NASA AWARDS GIVEN

MSC Participates In State, And Regional Science Fairs

Youngsters in an eight-state region who are more interested in space sciences than in spending their time under the hood of a hot-rod or reading movie magazines are given encouragement and guidance by scientists and engineers working the nation's manned space flight program.

The Manned Spacecraft Center here is participating in 24 regional and state science fairs being conducted this spring for youngsters in grammar and high schools.

Students entering exhibits in science fairs affiliated with National Science Fairs-International are eligible to compete for science awards made by the National Aeronautics and Space Administration through its field Centers.

The NASA Centers not only provide Certificates of Merit and aerospace mementos in the form of tie clasps, pins or cuff links, but technical experts from the Center serve as judges in 24 of the science fairs.

Manned Spacecraft Center provided or will provide awards to winners in 53 science fairs in the eight-state region which includes Texas, North Dakota, South

Dakota, Nebraska, Kansas, Colorado, Oklahoma and New Mexico. Most of the fairs are regional or state fairs, and include private and parochial as well as public school students.

NASA awards are made to students whose exhibits are judged best in six different categories: Aerodynamics and Space Flight, Space Vehicles, Space Propulsion Systems, Space Life Sciences, Space Physical Sciences and Space Electronics and Communications. Entries are judged on the basis of creative ability, scientific thought, thoroughness, skill and dramatic value.

Each NASA award winner will have the opportunity to take part in an orientation program at the Manned Spacecraft Center, but travel to and from Houston will be at the student's own expense.

Apollo

(Continued from page 1)

pounds from the S-I stages eight H-1 liquid propellant rocket engines.

After ascending to approximately 220,000 feet in less than two and one-half minutes, the first stage (S-I) engine burnout will occur.

At 230,000 feet the S-I stage will be jettisoned and the six RL-10 engines of the second stage (S-IV) will ignite and continue to accelerate the Apollo spacecraft with a thrust of 90,000 pounds.

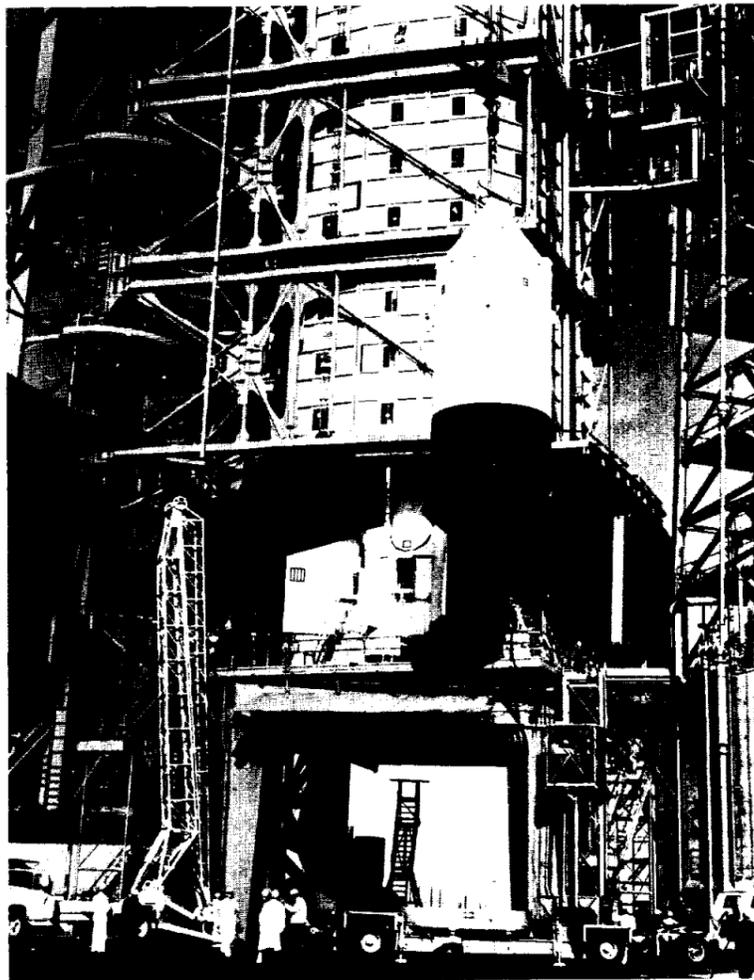
The launch escape tower will be jettisoned at about 265,000 feet and the S-IV engines will continue to burn until an altitude of some 115 miles has been reached.

Then the space vehicle will be injected into a circular parking orbit around the earth and S-IV engine cutoff will occur.

No recovery of the Apollo spacecraft is planned for this test flight.



MATING ESCAPE TOWER—The escape tower, topped by the escape motor, is lowered into place by workmen as it is mated to the Apollo Boilerplate-12 spacecraft atop the Little Joe II launch vehicle in New Mexico.



APOLLO BOILERPLATE-13—The Apollo boilerplate spacecraft is hoisted to the top of the SA-6 vehicle. The completely assembled spacecraft topping the Saturn I vehicle will include a command module, service module, adapter section and launch escape system.

APPLICATION DEADLINE MAY 6 -

MSC Technical Institute For Apprentices To Use On-The-Job, Classroom Training

Beginning in September, the Manned Spacecraft Center will open a Technical Institute for the training of apprentices by organized on-the-job and classroom training of qualified young men to become journeymen in several skilled trades.

The trades include electronic instrument maker, wood and plastic model-maker, experimental machinist, and spacecraft metalsmith.

Applicants for the program should have a well-rounded background in mathematics and must have demonstrated by hobbies or experience a keen interest in the above fields. In addition, applicants must pass a written examination which includes high school level algebra, physics, and geometry.

Deadline for making application is May 6 and tests

will be given in Houston, Beaumont, Hempstead, Huntsville, Livingston, Lufkin, Orange, Port Arthur, and Wharton after that date.

The four years of training will include work at MSC and classroom studies at a Houston university. Apprentices will receive college credits.

Supervising the Institute will be a Board of Governors headed by Paul E. Purser, special assistant to the MSC director. Also on the board will be Joseph V. Piland, Jack A. Kinz-

ler, Aleck C. Bond, Edwin Samfield, Sigurd A. Sjoberg, and Stuart H. Clark.

To apply for the training program, interested persons may obtain Civil Service Commission form 5000 AB at any U. S. Post Office or from the Board of U. S. Civil Service Examiners, at MSC.

Book

(Continued from page 1)

on a program of high speed research with rocket tests from Wallops Island, Virginia.

They jointly conceived the Little Joe solid propellant launch vehicle used in the Project Mercury development tests.

Faget is "father" of the Mercury spacecraft and has been honored for his original work on the design and for his contributions

to the various spacecraft systems.

The 41 other authors each will contribute a chapter to the book.

The text is based largely on a series of lectures given by the authors at University of Houston, Rice University of Houston, Texas and Louisiana State Universities. It is being printed under a private publishing contract with publication dates set for September.

Dr. Robert Gilruth, MSC director, has written the foreword.

Dr. Gilruth, Dr. Shea To Address

Conference On Peaceful Uses Of Space

The Fourth National Conference on Peaceful Uses of Space in Boston, Mass., was attended this week by representatives from NASA headquarters, Manned Spacecraft Center and other NASA centers.

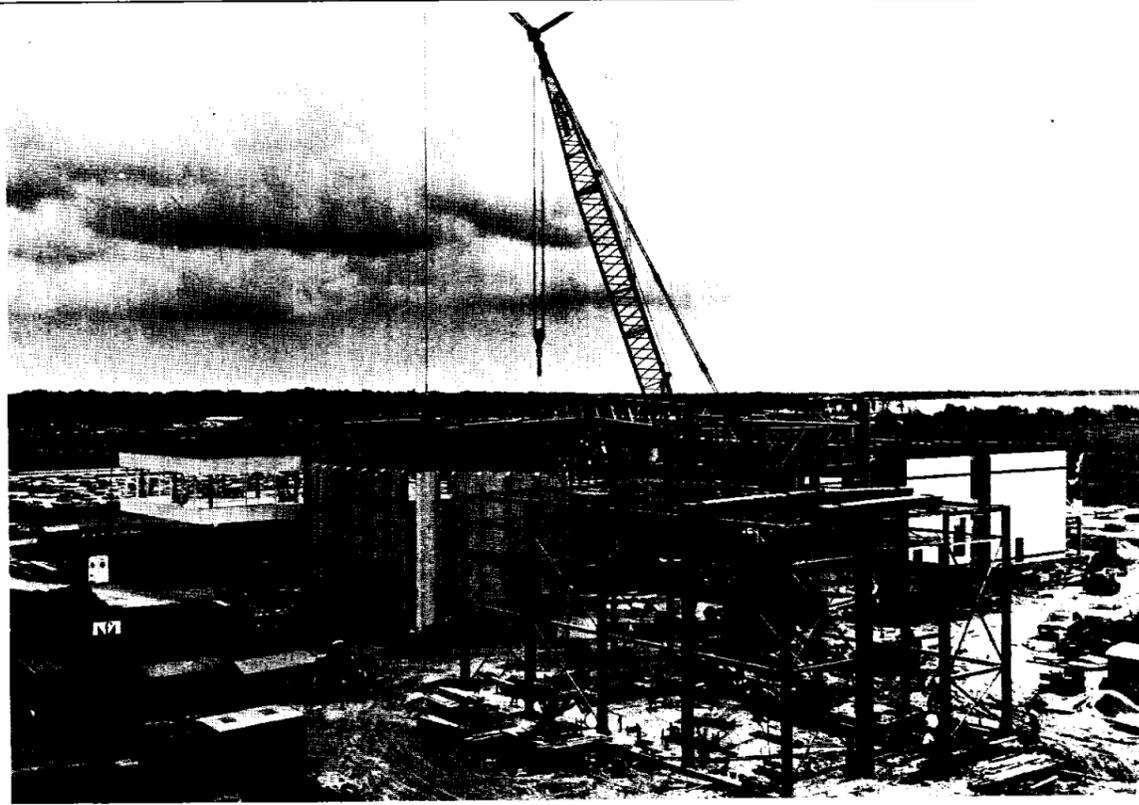
Sponsored by the New England community and NASA, the conference begins today and ends on Saturday.

A session on Manned Space Exploration, chaired by D. Brainerd Holmes, senior vice president, Raytheon Co., will be held today with papers being presented by Dr. Robert R. Gilruth, director, Manned Spacecraft Center, on "The U.S. Manned Space Flight Program from Inception to Date," and Dr. Joseph F. Shea, Apollo Program

manager, MSC, on "The Development of the Spacecraft and the Mission."

Other papers will be presented by Dr. George E. Mueller, Associate Administrator Manned Space Flight; Dr. Wernher von Braun, director, Marshall Space Flight Center; and Dr. Kurt H. Debus, director, Launch Operations Center.

In addition to the presentations by top NASA officials, leading scientists, businessmen and educators will report on the Nation's space program.



FLIGHT ACCELERATION FACILITY—With the erection of the exterior panels, the Flight Acceleration Facility begins to take on its distinctive shape. This facility, consisting of the rotunda, office and instrument wing, and the operative and shop wing, will house the large centrifuge in which forces up to 30 Gs can be applied to materials or lower forces to men. The steel framework in the foreground is the centrifuge power building. The entire facility will be operated by the Flight Acceleration Branch of Crew Systems Division and is scheduled to become operational in the early part of 1965



EVALUATION TEST MODEL of Apollo communication system is assembled in space equipment laboratory.



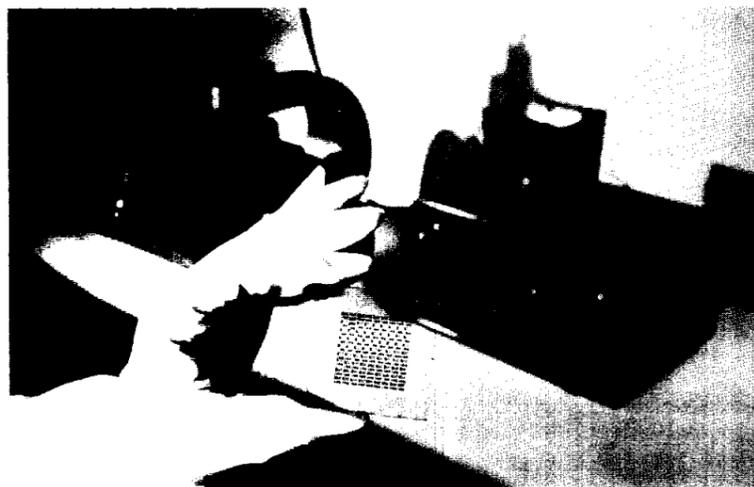
PART OF COLLINS Radio Company facilities at Cedar Rapids, Iowa. Large building in background contains engineering offices and facilities, fabrication and assembly areas. Building in right foreground contains data transmission and processing facilities, executive and sales offices, and research facilities.



MERCURY COMMUNICATIONS—Gloved hand holds two units in Mercury communication system designed and manufactured by Collins. Mercury communication equipment established a record of outstanding performance throughout the manned flight program.



COLLINS APOLLO TEAM—Arthur H. Wulfsberg, center, is program manager of Project Apollo effort at Collins. Carl R. Henrici, right is assistant Apollo program manager and James L. Westcot, left, is head of the program control staff for Apollo



MINIATURE CIRCUITS, similar to the circuits that someday may be used in space communication equipment, are produced in Cedar Rapids microelectronics laboratory of Collins Radio Company.

Collins Has Major Role In Manned

Providing communications for manned spacecraft programs is the role of Collins Radio Company in America's efforts to explore the space frontier.

In Apollo, for which Collins is assigned the telecommunication responsibility, the company faces its biggest challenge yet in developing and manufacturing equipment which will keep astronauts in touch with earth on their moon journey.

Meeting this responsibility, however, is a task for which Collins is well qualified because of its previous experience in X-15, Mercury and Gemini programs.

The Apollo communications effort has been described as an "immense program, involving not only hundreds of Collins engineers, technicians, production and support workers, but the supervision and coordination of the work of subcontractors as well.

It is a long-range and highly complex program, one which must provide

assured reliability essential for success of the mission, yet be flexible enough to incorporate new developments.

The major portion of Collins' space communication efforts is conducted at the company's Cedar Rapids, Iowa Division. Other major Divisions, which also have a part in space projects, are located at Dallas, Texas and Newport Beach, Calif.

The importance of communications in manned space flight was vividly demonstrated to millions of persons around the world as they heard the voices of America's astronauts from orbiting Mercury spacecrafts.

After providing the communication/navigation system for the X-15 rocket plane, Collins attained a prominent position on the industrial team for Project Mercury. Under contract to McDonnell Aircraft Corporation, Collins was responsible for the complete Mercury communication

system.

The Mercury communication equipment established a record of outstanding performance throughout the flight program. This record was cited by NASA in the Mercury program review held last year at MSC.

Because of the excellent performance of the systems, some of the backup equipment was deleted as unnecessary in the final two (MA-8 and MA-9) Mercury flights.

Again under contract to McDonnell, Collins now is delivering equipment for Project Gemini. The company's role in this project consists of providing the voice communication equipment—specifically the UHF transceiver, the primary voice communication radio; HF transceiver, the secondary or backup voice radio; and a voice control center containing UHF and HF selector controls and an intercom system for the two astronauts.

Gemini equipment basically involves refinements and increased reliability over Mercury transceivers.

The role of Collins in Apollo, however, is by far the most complex effort attempted to date in space communications. It also is the largest single engineering effort in the history of the company. The program is being done under contract to North American Aviation, prime contractor for NASA for Apollo.

The complexity of the project results from the many functions required of the system. As stated by W. S. Pope, communication system program manager for North American Aviation, the Apollo mission "will spread communication equipment across a 250,000-mile path"—from Cape Kennedy to the moon



APOLLO COMMUNICATION CONTROLS—Engineers Robert Mitchell (left) and Carl Henrici check on communication controls location in mockup of Apollo command module.

Spotlight On Secretaries...

Secretaries for this issue of the Roundup include one native Texan and three Virginians, the latter three having joined NASA at Langley. Two of the girls have their offices in the Rich Building and the other two are with Apollo in Bldg. 2, site one.

DOREEN HORROCKS (upper left), secretary to David W. Gilbert, manager, Apollo Navigation and Guidance, is a native of Burlington, Tex. She joined MSC in March 1962 as a clerk-typist in the Personnel Office, and the following month transferred to the Apollo Project Office. She attended high school in Rosebud, Tex. Previous experience includes 13 years with the U. S. Army Recruiting Service in various capacities, the last one as secretary to the commanding officer for two years. Doreen has two children, Sandye 13, and Mike 9. They reside in Pasadena. She counts dancing and reading among her most enjoyable outside interests.

JEAN REECER (lower left) is secretary to Ralph S. Sawyer, deputy chief, Instrumentation and Electronic Systems Division. She joined the Space Task Group, Langley Field in December 1961, becoming a branch secretary in April 1962 and a division secretary in November 1962. Born in York County, Va., she attended high school in Newport News, Va. and attended Madison College, Harrisonburg, Va., taking a two year secre-

tarial course. Prior to joining NASA she worked for the Newport News Shipbuilding and Dry Dock Co. Jean was recently married to Robert L. Reecer of MSC's Information Systems Engineering Office. The couple resides in Houston. Her hobbies include reading, fishing and water skiing and she enjoys tennis and bicycling.

ALEXANDRA M (SANDY) MACPHERSON (upper right) joined NASA in November 1961, at Langley Field, Va., as a branch secretary in the Spacecraft Technology Division. She is presently secretary to W. Kemble Johnson, executive assistant, Apollo Spacecraft Program Office. Sandy was born in Newport News, Va., where she also completed high school. She attended Hampton Roads Business College, Hampton, Va. Prior to joining NASA, she worked with the Peninsula Chamber of Commerce. She resides in El Lago, Seabrook, Tex., and her interests include the theater, good music, cooking and coin collecting.

NANCY C ALEXANDER (lower right) is secretary to Dr Robert C. Duncan, chief, Guidance and Control Division. She joined NASA and the Space Task Group as a clerk-stenographer at Langley in June of 1959. Born in Hampton, Va., she attended high school in Gloucester, Va. Nancy resides in Houston and includes among her outside interests, reading, water sports, and taking weekend trips.



MSC BOWLING ROUNDUP

MSC COUPLES LEAGUE
Standings as of April 21.

Team	Won	Lost
Ridgerunners	35 ¹ / ₂	16 ¹ / ₂
Lame Ducks	33 ¹ / ₂	18 ¹ / ₂
Hackers	26 ¹ / ₂	25 ¹ / ₂
Bowlernauts	26	26
Goofballs	26	26
Spare-O's	25	27
Four Aces	23 ¹ / ₂	28 ¹ / ₂
Schlitz	23	29
Shucks	21	31
Piddlers	20	32

High Game Women: C. Clyatt 215, V. Lantz 200.

High Game Men: H. Maples 245, G. Sanders 223.

High Series Women: C. Clyatt 515, J. Sands 513.

High Series Men: H. Brasseaux 564, H. Maples 560.

MSC MIXED LEAGUE
Standings as of April 21.

Team	Won	Lost
Alley Oops	88 ¹ / ₂	35 ¹ / ₂
Eight Balls	78	46
Celestials	70	54
Five Flushers	69 ¹ / ₂	54 ¹ / ₂
Snap Shots	69 ¹ / ₂	54 ¹ / ₂
Pricers	67 ¹ / ₂	56 ¹ / ₂
Space Mates	66	58
Virginians	65	59
Little Splits	64 ¹ / ₂	59 ¹ / ₂

Hardley Ables	58 ¹ / ₂	65 ¹ / ₂
Core Dumps	53	71
Aborts	51	73
Gabs	40	84

High Game Women: C. Barnes 213, 207, M. Lewis 211.

High Game Men: A. Farkas 246, B. Harris 240, J. Pavlosky 236.

High Series Women: C. Barnes 554, 545, 545.

High Series Men: P. Petersen 640, A. Chop 632, 606.

High Team Game: Alley Oops 984, 938, 930.

High Team Series: Alley Oops 2658, 2636, 2597.

MSC MEN'S LEAGUE
Standings as of April 16.

Team	Won	Lost
Lunar Lights	33	19
Turkeys**	29	19
Technics	29	23
Pseudonauts**	28	24
Overshoots	28	24
Spastics	28	24
Whirlwinds	27	25
Fizzlers**	21	27
Asteroids	19	33
Cosmonuts	14	32

**Postponed Games

High Game: J. Garino 266,

B. Harris 263.

High Series: J. Keggin 650, J. Strickland 621.

High Team Game: Technics 965, Turkeys 940.

High Team Series: Technics 2566, Spastics 2488.

NASA 5 PM MONDAY
Standings as of April 20.

Team	Won	Lost
Hot Shots	36	20
Alley Gators	32	24
P&C Div.	30	26
Suppliers	30	26
Computers	28	28
Accounting	12	44

High Game: J. Harris 215, E. Walker 213, G. Carter 211.

High Series: A. Lee 592, G. Carter 578, J. Harris 567.

High Team Game: Alley Gators 920, P&C Div. 869, Computers 864.

High Team Series: P&C Div. 2519, Computers 2442, Hot Shots 2417.

Open House Dates Set For Employee's Families

A series of special open house dates have been arranged to permit MSC employees to show their working areas to family and friends.

The first of these open houses was held this past weekend for Bldgs. One and Two.

The remainder of the schedule will be held for the following buildings on the following dates: Bldgs. Eight and Ten, May 3; Bldgs. Four and Seven, May 10; and Bldgs. 13 and 16, May 17.

Open house hours will be from 12 noon to 5 p.m.,

and the Second and Third Street entrances will be open to employee vehicles.

Employees making the visits to their work areas will be expected to follow a series of guidelines and instructions which were published on MSC Announcement 64-60.

Any questions concerning the arrangements should be directed to the MSC Security Division.



TWENTY YEARS AWARDS -- Jack A. Kinzler (left), chief, Technical Service Division, makes presentation of 20-year service awards and letters to division employees. They are (l. to r.) Gail Blalock, James Bailey, Roger Peterson and David L. McCraw.

EAA Board Meets, Discusses Activities

Members of the Employees Activities Association Executive Board met on April 7 with the following items being discussed: EAA publicity for the Roundup, the spring dance, June boat trip, picnic, bingo, and the appointment of a new board member.

In addition to David Bell being appointed to fill the

unexpired term of James Epperly as chairman of Buildings, Grounds and Safety Committee, other changes have been made recently in the EAA Board.

The board members now serving are Alfred J. Ligrani, president; Abner Askew, vice president; Claude Ingles, treasurer; Phoncille Devore, secre-

tary and chairman of the Promotion Committee; Mary Sylvia, chairman of the Social Committee; Ragan Edmiston, chairman of Activities Committee; David Bell, chairman, Buildings, Grounds and Safety Committee; Mervin Hughes, chairman of Arts and Craft Committee; Joe McMann, chairman of Children's Committee; and Donald T. Gregory, Exchange Council representative.

Ligrani stressed at the meeting that all publicity on EAA activities had to be to the committee chairmen by the Monday before payday as the Promotion Chairman must have all copy by Tuesday to meet the deadline for publication in the Roundup.

Mary Sylvia and Claude Ingles were commended by the fine job they did on the spring dance.

The following subchairmen were selected for the following activities: Flossie Legett, June boat trip; Marilyn Bockting, picnic; and Tony Yeater, bingo.

MSC Doctor Recommends Get Polio Immunization Early

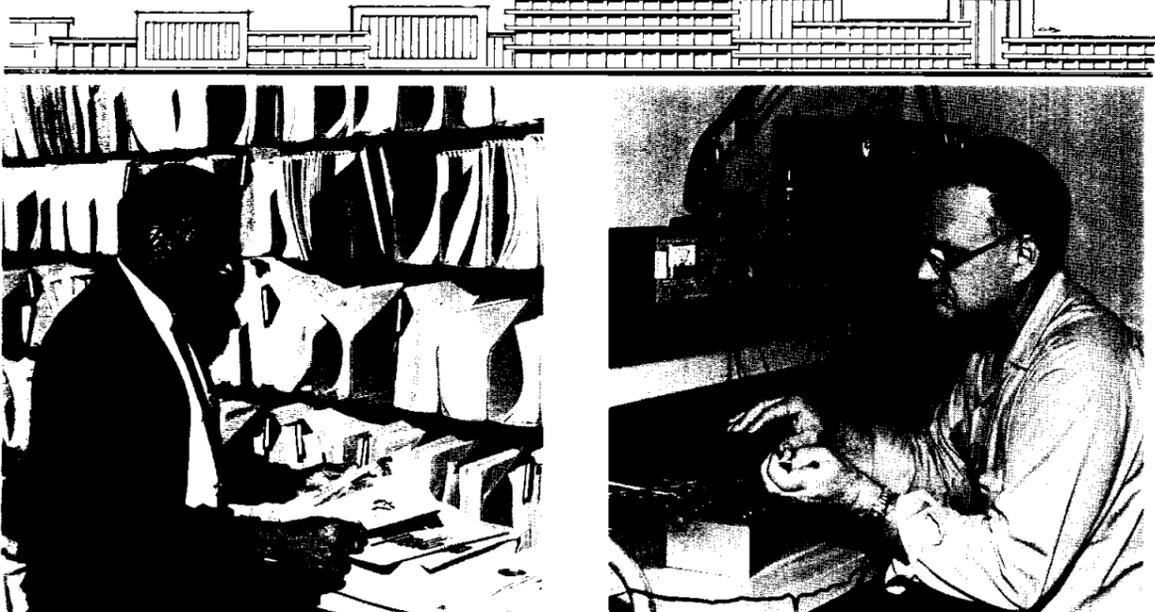
Dr. Phillip P. Pease, Center Medical Operation Office, here at the Manned Spacecraft Center urged all employees of the Center and their families to take immunization vaccine for polio prior to the advent of warm weather.

He cited the recommendation of the Harris County Medical Society that all residents of Harris County (as well as adjoining counties) under 21 years of age take a single booster

dose of the oral trivalent poliovaccine (three strains in one dose) if they have had the initial series of immunizations in 1962 and 1963.

Those who have not had the initial immunizations against polio, regardless of age, should get them as soon as possible. To achieve maximum benefit, the patients should take the vaccine before warm weather.

MSC at work...



ROBERT L. PHELPS, library assistant, Library Branch, Technical Information Division, files documents in the documentation branch of the Technical Library.

TROY L. WILLIAMS, electronic technician, Flight Data Systems Branch, Instrumentation and Electronic Systems Division, is breadboarding a timing circuit for a PCM DECOM simulator.

how to be a spy

in six easy lessons



I

Join a group and pretend you belong there. Be unobtrusive, or bold, as the occasion demands. Nice guys assume that everyone else is a nice guy and — here's a laugh — won't challenge your "need to know" for fear of hurting your feelings!

—Reprinted Courtesy General Dynamics News

SAFEGUARD CLASSIFIED MATERIAL!

MSC Credit Union Adds Pay Check Cashing Service

The MSC Credit Union has added a new service of cashing pay checks for members.

The Credit Union is located in Building 2, Room 120, and any MSC employee may join by depositing \$5.

Over 1500 members are presently in the Credit Union with assets of over \$440,000 and loans to members standing at nearly \$900,000. A dividend of 5.04 per cent was paid members last year.

Operation of the Credit Union is directed by 10 MSC employees who serve without remuneration.

Any member of the credit union is eligible for a loan if he qualifies and is approved by the loan committee.

As an extra benefit each member from six months to 55 years of age is given free life insurance for each dollar in savings up to

\$2,000. No physical examination is required for this insurance.

For more information on the credit union go by their office or call Ext. 32066.

Cafeteria Open 12 Hours Daily Monday-Friday

The MSC Cafeteria is open continuously from 7 a.m. to 7 p.m., Monday through Friday and from 10 a.m. to 2 p.m. on Saturday, it was announced by the NASA Exchange Council.

Weekdays, breakfast is served from 7 to 8 a.m., lunch 11 a.m. to 2 p.m., and dinner from 5 to 7 p.m.

There has been some confusion regarding the hours between regular meals as to whether the cafeteria was open or closed.



SECRETARIES TREATED—Twelve secretaries of the Computation and Analysis Division at MSC were treated to lunch by their bosses last week in the Executive Dining Room of the Cafeteria. The occasion was National Secretaries Week. Shown at one of the tables (l. to r.) are Ralph Everett, assistant division chief and his secretary Alice Davis; secretary Sarah Galloway and her boss Eugene H. Brock, division chief.



TRAINING IN WELDING for Apollo communication equipment in pilot line assembly area of Collins Radio Company, Cedar Rapids, Iowa. In background at left is Gemini equipment assembly area.

ed Spacecraft Communications

and back to earth.

Briefly, the major functions of the Apollo telecommunications system provided by Collins are:

Voice communication facilities aboard the command module for the astronauts to communicate with earth. Two types of equipment are planned, one for near earth communication and one for deep space communication.

A spacecraft intercommunication system.

Telemetry equipment to transmit scientific and operational information back to earth.

Tracking and ranging beacon equipment to keep tracking stations on earth informed of the position of the spacecraft.

Rescue voice and beacon equipment, for communication during the earth landing phase of the mission.

Currently the Apollo communication project is in the development and evaluation test stage. Collins is managing the efforts of four major subcontractors as well as its own extensive program.

Collins long has been noted for the emphasis on quality and reliability of its products. The Apollo program, however, has added new dimensions to standards for reliability of equipment, and Collins is girding its efforts to attaining the performance required for landing Americans on the moon and returning them safely to earth.

"Reliability begins in the design phase of equipment, and is essential throughout the development and pro-

duction phases," said A. H. Wulfsberg, manager of the Apollo project for Collins.

However, the increased complexity of the mission and equipment required for Apollo necessitate "pushing the state of the art" in technical performance, lightweight equipment and reliability. Such are the challenges facing Collins Radio Company in designing and producing the communication systems.

For Apollo equipment there will be special manufacturing facilities with specialized techniques and quality assurance procedures to meet or surpass stringent NASA requirements.

The foundation for undertaking a program of the magnitude of Apollo communications has been laid in three decades of communication-oriented electronics experience by Collins Radio Company.

The company was founded at Cedar Rapids by Arthur A. Collins in the early 1930s to manufacture quality amateur radio equipment. Since then the company, which Mr. Collins continues to head as president and chairman of the board, has grown to an international corporation with more than 16,500 employees and major divisions in Iowa, Texas and California.

Collins communication equipment played a major role in ground, sea and airborne operations during World War II and the Korean conflict. Development by Collins of single sideband radio as a practical communication technique led to

adoption of single sideband as the backbone of U. S. military communication systems in recent years.

Throughout the history of the company, and more than ever today, heavy emphasis is placed on research and development to meet the needs of the future. Approximately 20 per cent of the company's personnel facilities are devoted to research and development.

Collins has an extensive microelectronics program underway at Cedar Rapids, Dallas and Newport Beach. The program includes both thin film and integrated semiconductor circuit capabilities.

The company is working with the noted State University of Iowa space scientist, Dr. James Van Allen, in a satellite instrumentation project.

In addition to its spacecraft communications role, Collins also has a prominent part in providing ground equipment for space tracking networks. Both the Atlantic and Pacific Missile Ranges utilize Collins tracking and communication equipment. The Pershing missile command control system, and fuze and guidance systems for missiles are other Collins space-related activities.

At Dallas, Collins has erected a giant deep space tracking antenna, one of the most accurate ever built. Tracking of the Echo I and II balloon satellites from stations at Cedar Rapids and Dallas is a project which has resulted in a wealth of data on the use of passive satellites for communication purposes.

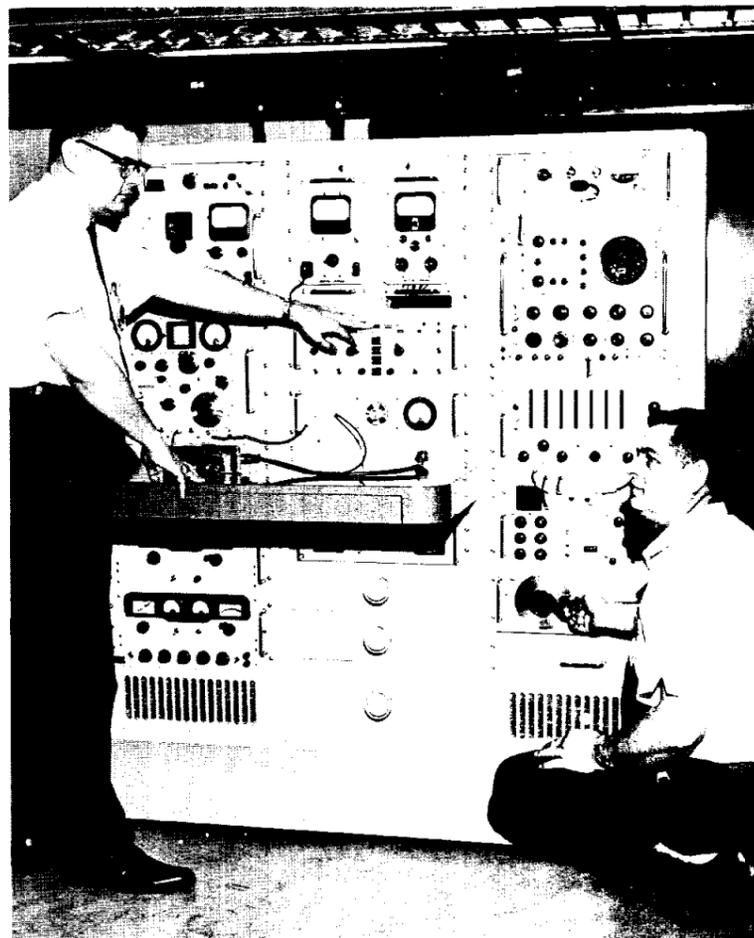
Collins has demonstrated its capabilities as a pioneer in the field of space communications, and looks to more challenging roles in the future as America expands its exploration of the space frontier.



ARTHUR A. COLLINS, founder and president of Collins Radio Company, poses with Mercury communication equipment.



GROUND TEST EQUIPMENT for Apollo communication systems is an important part of the work being done by Collins Radio Company.



GEMINI CONSOLE—Collins Radio Company Project Engineer John Zinkus, left, and Technician Robert Siex run test with console unit designed and built for testing Gemini voice communication equipment.

EDITOR'S NOTE: This is the twenty-sixth in a series of articles designed to acquaint MSC personnel with the Center's industrial family, the contractors who make MSC spacecraft, their launch vehicles and associated equipment. The material on these two pages was furnished by the Public Relations Department, Collins Radio Company.

The SPACE NEWS ROUNDUP, an official publication of the Manned Spacecraft Center, National Aeronautics and Space Administration, Houston, Texas, is published for MSC personnel by the Public Affairs Office.

Director Robert R. Gilruth
Public Affairs Officer Paul Haney
Chief, News Bureau Ben Gillespie
Editor Milton E. Reim

WELCOME ABOARD

One-hundred and fourteen new employees joined the Manned Spacecraft Center during the period March 15 through April 16, 1964. Of this total 13 were assigned to Cape Kennedy, seven to White Sands Missile Range, two to St. Louis and one to Downey.

MSC-FLORIDA OPERATIONS (Cape Kennedy, Fla.): Allen F. Risley, Herbert D. Ward, Zoa F. Hill, Ronald C. Curry, Charles E. Bradshaw, David C. Buckwalter, George L. Baughman, Ronald C. Bass, Carson M. Giesler, William H. Schick, Marie T. Parker, Alfred M. Cave, Carole A. Bailey, and Leonard A. Dotson (St. Louis, Mo.).

OFFICE SERVICES DIVISION: Edith B. Miller, and Charles J. Yacura.

ENGINEERING DIVISION: Joseph G. Griffith, Jerry M. Littlefield, Thomas C. Snedecor, William R. Decherd, James D. Williams, and William Y. Lee.

TECHNICAL SERVICES DIVISION: Paul S. Moravsek, Roberta L. DeVos,

Gordon E. Boatright, Quinan W. Swing, Charlie A. Vernon Jr., Gilbert J. Cisneros, Lewis A. Wilde, Henry C. Stearns, Daniel G. Ramirez, and Leroy E. Mullaley.

PERSONNEL DIVISION: Madonna M. Gann, Lupe Q. Muniz, Georgia L. Miller, Marilyn E. Dotson, and Margaret N. Randall.

PHOTOGRAPHIC DIVISION: Carolyn R. Rutledge, Charles L. Morgan, and Charles C. Frazee.

LOGISTICS DIVISION: Nancy B. Woolridge, Estefana L. Cortez, and Elsie M. Easley.

PROPULSION AND ENERGY SYSTEMS DIVISION: Albert L. Williams, Leonard W. Lock, Benny B. Sprague, Richard A. McComb, Neil A. Townsend, James P. Crabb, and Gary D. Meester (White Sands, N.M.).

RECOVERY OPERATIONS DIVISION: Joseph R. Vice.

CENTER MEDICAL OPERATIONS OFFICE: Frances O. Price, and Sandra

MSC Officials To Speak Before Astronautical Group

The Technical Progress on Lunar Flight Programs will be the theme of the 10th annual meeting of the American Astronautical Society in New York, May 4-7.

NASA representatives on the technical program will include Dr. George E. Mueller, Associate Administrator for Manned Space Flight, delivering the keynote address May 5 on "Status of the U.S. Lunar Flight Program."

From the Manned Spacecraft Center, Robert O. Piland, deputy manager, Apollo Spacecraft Program Office, will deliver a paper May 6, on "Manned Lunar Space Vehicles."

Also in this session on "Manned Lunar Operations," May 6, from MSC will be Christopher C. Kraft, on "Flight Operations"; Dr. Charles A. Berry on "Space Medicine"; Astronaut Alan B. Shepard on "Mission"; and Kurt Debus, director, John F. Kennedy Space Center, on "Launch Operations."

K. Myers.

INSTRUMENTATION AND ELECTRONIC SYSTEMS DIVISION: Concordia A. McMillan, Donald A. Streater Jr., Dianne Milner, Jerry L. Osborne, and John D. Miller.

STRUCTURES AND MECHANICS DIVISION: Grimmed M. Leavines, Donald J. Tillian, Barbara L. Robinson, Raymond E. Sanders, Hughie L. Perry, and John E. Burton.

PROCUREMENT AND CONTRACTS DIVISION: Paul K. Jones, Mildred J. Eernisse, and Penelope L. Hathaway.

GUIDANCE AND CONTROL DIVISION: William H. Hamby, and William E. Miller.

APOLLO SPACECRAFT PROGRAM OFFICE: Audrey M. Williams, Helen J. York, James S. Cooper, Mary L. Dorrough, Robert L. Ward, Gwendolyn M. Seate, Capt. John C. Marshall, Allan E. Cooper Jr. (White Sands, N.M.), Hector M. Rodriguez (White Sands, N.M.), Richard D. Souders (White Sands, N.M.), and Gordon J. Stoops (Downey, Calif.).

CREW SYSTEMS DIVISION: Jerome M. Klassen, Robert L. Jones, and Gwen L. Shankle.

MISSION PLANNING AND ANALYSIS DIVISION: Patricia A. Felder, Jean A. Latham, Patrick O. Wheatley, Thomas W. Buckman, Gay N. Williams, and Margaret E. Banneau.

ADVANCED SPACECRAFT TECHNOLOGY DIVISION: Robert C. DeHart, William P. LeCroix, Dan-

MSC PERSONALITY

Philip M. Deans Provides Liaison Support To Gemini

"I consider my job to be an interesting challenge," is the way Philip M. Deans speaks of his position as technical assistant to the Assistant Director for Engineering and Development, Manned Spacecraft Center.

Deans provides the coordination and liaison for the specialized technical support from the various divisions of the Engineering and Development Directorate to the Gemini project.

In addition to his regular duties, Deans was also a contributor to the book "Engineering Design and Operation of Manned Spacecraft," which is to be published soon. The book outlines the latest technologies involved in flights for the moon. He wrote the chapter on "Launch Escape Systems."

Deans was born in Wilson County, N. C. and attended high school in Wilson, N. C. He was the recipient of a competitive full scholarship to North Carolina State and was graduated from that college, in Raleigh, N. C., with a BS degree in mechanical engineering in 1959.

After graduation he joined the NASA Space Task Group at Langley as an aeronautical research engineer in the Mechanical Systems Section, Flight Systems Division.

iel E. Supkis, Viljar Sova, and Stanley H. Brown.

GEMINI PROGRAM OFFICE: Margie E. Beck, Merle J. Denny, John Vincze, and Carol J. Kopitz (St. Louis, Mo.).

FLIGHT CREW SUPPORT DIVISION: June P. Shoosmith, James L. Ellis Jr., and Charles C. Thomas.

PROGRAM ANALYSIS AND RESOURCES MANAGEMENT DIVISION: Ronald L. Hay, and Betty S. Chancey.

WHITE SANDS MISSILE RANGE (New Mexico): John M. Hawk, Sterling E. Davis, and William A. Lokken.

OFFICE OF ASSISTANT DIRECTOR FOR FLIGHT OPERATIONS: Barbara A. Duple.

FACILITIES DIVISION: Bernard A. Marlow.

FLIGHT CONTROL DIVISION: Gerald J. Walker, and Thomas R. Loe.

OFFICE OF ASSISTANT DIRECTOR FOR FLIGHT CREW OPERATIONS: Nancy C. Lowe.

COMPUTATION AND ANALYSIS DIVISION: Betty J. Grant.

OFFICE OF ASSISTANT DIRECTOR FOR ENGINEERING AND DEVELOPMENT: Donald E. Wagner.

RELIABILITY AND QUALITY ASSURANCE OFFICE: Elizabeth B. Harlowe.

In August of 1959 he was called to active duty as a lieutenant in the Air Force



PHILIP M. DEANS

and was assigned to the same job at Langley. His job consisted of monitoring the development and qualification testing of the Mercury spacecraft on-board recovery system components.

From July 1960 to February 1961 he was assigned to the Engineering Division of the STC at Langley as the project engineer on Mercury spacecraft eight and eight-A, MA-3 and MA-4, to insure that the prime contractor properly equipped and tested the spacecraft before delivery.

He also worked in a similar capacity after being assigned to the MSC, NASA Field Office at McDonnell Aircraft in St. Louis from February 1961 to July of 1962.

In September 1962, after serving three years in the Air Force he joined MSC as a project engineer in Gemini, working in the area of spacecraft operations.

Deans assumed his present duties in October 1963.

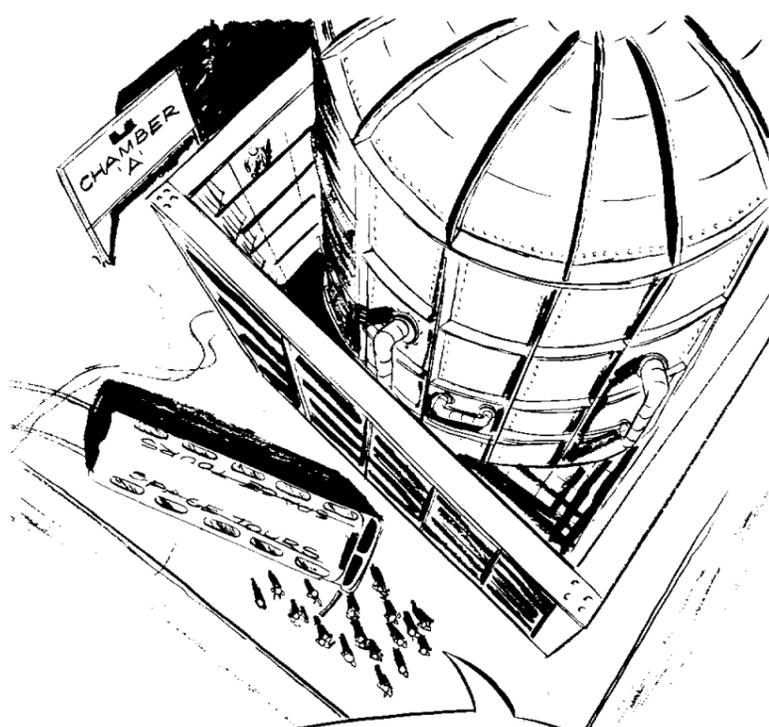
Research fields he has specialized in to date in his career have included landing and recovery systems, pyrotechnics, propulsion and life support systems, manned spacecraft development, preparation and checkout.

He is married to the former Linda Sue Stell Santa Rosa, Calif. The couple resides in Pasadena Tex.

Deans enjoys flying occasionally but has not yet received his pilot's license.

His hobbies include wood-working, reading, writing and sketching. He also enjoys swimming and water skiing.

On The Lighter Side



"THAT'S WHAT I SAID, FOLKS, '23,000 GALLONS OF HOT COFFEE DAILY, FROM RIGHT HERE TO ANY PLACE IN THE CENTER!'"

Thirty-Day Simulated Space Voyage Conducted Successfully By Five Men

Five men emerged from a special sealed chamber at the Boeing Company, Seattle, Wash., successfully completing a simulated 30-day voyage into space.

The five entered the chamber March 2 to test one of the most complex life support systems yet devised for keeping men alive in space. They emerged in good health and spirits at 7 p. m. EST, April 1.

"The system functioned very well," Rober Barnicki, commander of the crew, said after emerging from the chamber. "We had only a few minor technical problems. I think all of us could have continued in the chamber, but the motivation would have been lacking. We felt that during the 30 days we'd gained all the data possible from this particular system."

The chamber was designed and built by Boeing for the Office of Advanced Research and Technology of the National Aeronautics and Space Administration. Systems included all elements of life support for a 150 man-day space mission.

This was the first time a biological system has been operated with other systems and with humans. Water from body wastes, cabin condensation and sink drainings was used for drinking and washing after it had been processed by a waste disposal and water-reclaiming system.

Oxygen breathed by the five men inside the 2,350-cubic-foot chamber was supplied by solid sodium superoxide chemicals. The chemicals absorbed carbon

dioxide while generating oxygen. Cabin air was monitored constantly for contaminants which might have been toxic to humans.

The system evaluated by NASA was among those the space agency is studying for possible application to advanced space flights.

The Boeing contract is valued at approximately \$500,000.

Barnicki, commander of the crew in the chamber test, is a 28-year-old X-15 personnel equipment specialist from NASA's flight research center in Southern California.

Light Beam Carries Voice, Could Be Used On Moon

A space agency scientist has developed a device for one-way transmission of voice communications on a beam of light.

Aiming the beam from a 25-watt light at a person equipped with a type of reflecting mirror, an experimenter was able to hear his partner in full daylight at a distance of a mile.

With a six-watt bulb, voice communication was said to be satisfactory at distances up to 200 feet.

The instrument may be developed for a wide variety of uses such as air to surface, ship to ship and ship to shore.

NASA said the system, called a retrometer, differs from previous voice communications on light beams in that the station originating the communications requires no power other than the human voice.

The retrometer -- so named because the light beam over which voice signals are sent is returned to its source by a simple reflector -- was devised at NASA's Langley Research Center, Hampton, Va.

Researcher Numa E. Thomas developed the de-

vice while investigating optical methods of communications between the ground and a reentering spacecraft during the radio blackout period.

Thomas said the device could be used for communication by astronauts on the moon, or people in a noisy factory or other places when radio or telephone communications were impossible.

The retrometer consists of a light source and light-collection system housed in one unit called the source-receiver unit; and a corner-shaped reflector acting as the microphone in the communication system, used by the partner who does the speaking.

The operator of the source-receiver unit focuses a narrow beam of light on the other person, and has optical equipment for collecting the reflected light and directing it to a photo-sensitive cell. The equipment also includes an audio amplifier and speaker.



RECENT MSC VISITORS--Baron Wolfgang von Gronau, who in 1930, was the first man to pilot a plane from Europe to America, visited here at MSC recently. Paul E. Purser, special assistant to the director, (left) talks to Baron von Gronau and his wife. Here from Germany, von Gronau is taking a tour of the NASA space centers.

RCA Contracts For LEM Communications Subsystem

A \$22 million contract from Grumman Aircraft Engineering Corporation, Bethpage, Long Island, has been awarded to RCA for the communications subsystem of the Lunar Excursion Module (LEM), the spacecraft will carry two of our astronauts to the moon's surface.

This is the second multi-million LEM contract received by RCA from Grumman.

As subcontractor to Grumman, RCA has responsibility for the LEM communications subsystem, the radar subsystem, portions of the stabilization and control subsystem, and ground support equipment.

A \$23.5 million contract for the radar subsystem was awarded to RCA by Grumman in November, 1963. Contracts for the remaining RCA LEM responsibilities are under negotiation.

The communication subsystem will provide communications links between LEM and the earth, between LEM and lunar orbiting Command Module from which LEM will descend to the surface, and, after the landing is achieved, between LEM and the astronaut walking on the moon.

Continuous voice and telemetry data will be sent to earth by the communications subsystem except while the LEM spacecraft is on the far side of the moon. Voice links between the astronauts in their space suits as well as between LEM and the Command Module will also be

provided.

Design requirements call for maximum utilization of advanced solid state circuits to obtain extreme light weight and high reliability for the equipment.

Bell To Build Propellant Tanks For LEM Reaction Control System

Textron's Bell Aerosystems Company has been awarded a \$3.5-million contract to provide the positive expulsion propellant tanks for the reaction control system of Project Apollo's Lunar Excursion Module (LEM).

Bell was selected to develop the positive expulsion tanks by Grumman Aircraft Engineering Corporation of Bethpage, N.Y., NASA's prime contractor for the Lunar Excursion Module. The LEM is the portion of the three-module Apollo spacecraft which actually will land on the moon.

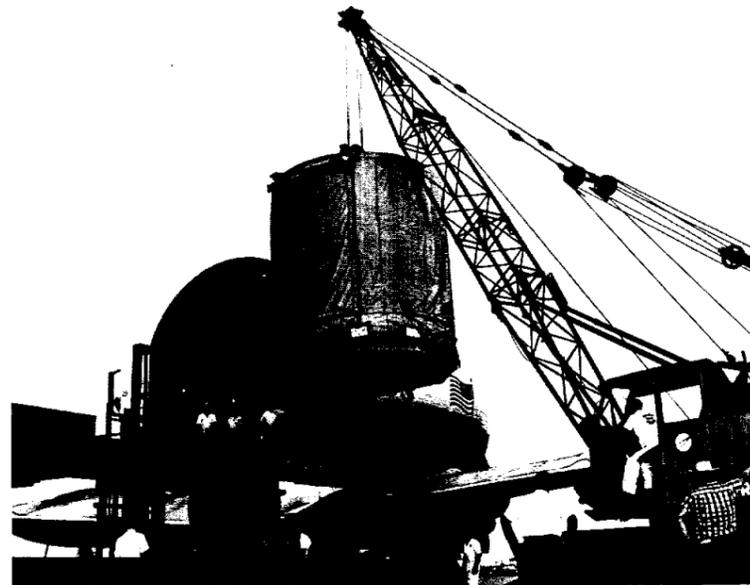
The Bell tanks will be used in the lunar-landing spacecraft to supply the propellants to the reaction control rockets which are used for positioning, orientation and stabilization of the LEM during its flight to the lunar surface and back to the orbiting Apollo Command and Service modules.

The LEM positive expulsion tanks will be similar to the tanks which Bell is

building for the Apollo Command and Service modules under contract to North American Aviation.

Positive expulsion devices are required in space vehicles because the liquid propellants do not flow naturally toward the tank outlet as they would on earth. Instead, under the zero or less-than earth gravity conditions of space flight, the propellants tend to float in the tank or cling to the tank walls.

Positive expulsion of the reaction control propellants for the LEM will be achieved by enclosing the fuel and oxidizer in flexible bladders within the tank. Pressure applied between the tank wall and the propellant-filled bladder squeezes the propellant to the reaction control rockets.



HERE FOR TESTING---Workmen unload BP-22 Apollo service module from the "Pregnant Guppy" airplane at Ellington AFB. The cargo which was unloaded last week, was flown here from California to undergo vibration tests by the Structures and Mechanics Division at the Manned Spacecraft Center. The test will be conducted by the Structures Facilities Branch with support from the Technical Services Division.



SECOND FRONT PAGE

Lunar Vehicle Re-entry Heat Measured By Project FIRE

A heavily-instrumented 200-pound spacecraft resembling a miniature Apollo moonship was launched on a ballistic trajectory from Cape Kennedy, April 14, to measure the heat that will sear manned spacecraft returning from lunar missions.

The Project FIRE spacecraft was launched by an Atlas-D on a high-arching path more than 500 miles into space.

As the craft plummeted back toward earth, a 10-foot long solid-fuel Antares II rocket ignited for a 30-second burst to drive the package into the heat barrier of the atmosphere at seven miles a second. This was the first time a space payload had re-entered the atmosphere at speeds which will be experienced on returning from the moon.

A fireball estimated at 20,000 degrees (F.) charred the vehicle, while instruments in its interior radioed information to Ascension Island and to ships and planes stationed in the South Atlantic impact area off the west coast of Africa.

The meteor-like dive was also recorded by cameras and other optical devices.

One NASA official referred to the payload as a "flying thermometer" be-

cause of the more than 100,000 readings on heat data it was to transmit on the 45-second peak re-entry period.

The flight ended after about 32 minutes with the Project FIRE spacecraft plummeting to the bottom of the ocean south of Ascension, more than 5,200 miles from the launching pad.

Preliminary reports showed the spacecraft reached a velocity of 25,166 mph, well within specifications for the mission and faster than a returning moon spacecraft.

Excellent radio signals were received throughout the fiery re-entry.

Purpose of Project FIRE was to obtain data on heating rates, high temperature materials and loss of communications at lunar re-entry speeds. The data will also be used to verify that proper heat protection materials have been selected for the Apollo spacecraft.

Over 2400 Employees Now Relocated, Auditorium, Other Buildings Put In Use

Nearly 260 Manned Spacecraft Center employees moved to the Clear Lake site during April bringing the total of relocated persons to just over 2400.

Approximately 160 employees of the Structures and Mechanics Division moved into new offices earlier this month in the Systems Evaluation Laboratory at the Clear Lake site -- a two story building with adjoining laboratories.

The complex is designed to conduct experimental investigations on advanced materials, spacecraft structural parts and complete assemblies of spacecraft. Structural testing will be conducted under simulated space environmental conditions.

SMD offices are located in a building which is 186 feet long and 130 wide. The high bay building, containing laboratories, is 198 feet long by 92 wide, and 40 feet high. Inside is an overhead crane capable of transversing the length of the laboratory.

Personnel assigned to MSC's Guidance and Con-

trol Division occupied new offices in the Spacecraft Research building the latter part of this month. This complex of two connected buildings was occupied earlier by other Center employees.

Research in the areas of space communications, spacecraft instrumentation, guidance and control will be done in these buildings.

The 800-seat auditorium which is a part of a complex which contains MSC's Public Affairs Office was also put into use in April. The Auditorium is 192 feet long and 135 wide. It has 46,000 square feet of space including the stage.

Two recording studios are on either side of the stage. A large section in the front of the building has been set aside for press use during manned missions. At other times, this section will contain exhibits.



NASA ADMINISTRATOR VISITS MSC--James E. Webb, administrator of NASA paid a visit to MSC Monday along with: Dr. Robert Seamans, associate administrator; and from Congress, Representatives George H. Mahon, (D) Texas, and Gerald R. Ford, (R) Michigan. They arrived here in mid-afternoon, took a quick tour of some of the facilities, met with Dr. Robert R. Gilruth, director, and other MSC officials, and later in the evening Webb addressed the first Monthly Technical Symposium in the Auditorium. Richard S. Johnston (above left) chief, Crew Systems Division, explains to the group the "hard suit". Looking on (l. to r.) are Rep. Mahon, Rep. Ford, Dr. Seamans, Astronaut Gordon Cooper, Administrator Webb, Dr. Gilruth, and Dr. Charles A. Berry, chief, Center Medical Programs Office.

Next Four Gemini-Titan Flights To Carry 23 Experiments On Board

Flights GT-2 through GT-5 will carry on board 23 scientific and technological experiments, with the first one being a study of new techniques for eliminating radio blackout during re-entry flying aboard the second Gemini mission.

Thirteen of the experiments--eight scientific and five technological--are sponsored by NASA. Ten experiments, all technological, are sponsored by DOD.

The experiments were selected by the NASA Manned Space Flight Experiments Board from proposals made by scientists and engineers in NASA, DOD and the scientific community at large.

On the third Gemini flight, the first manned launch, scientific experiments will investigate the relationship between the effects of weightlessness and radiation on somatic human cells and growth effect on sea urchin cells. The sea urchin cells offer a simple system in which changes will be easily detected.

There will be six experiments on the fourth Gemini flight. Two will establish astronaut's ability to define objects in space, one will measure radiation, one is designed to determine whether there is any possibility of a lightning-like static electrical discharge when two objects dock together in space. Two scientific experiments will involve photography of weather systems and major geological features on Earth.

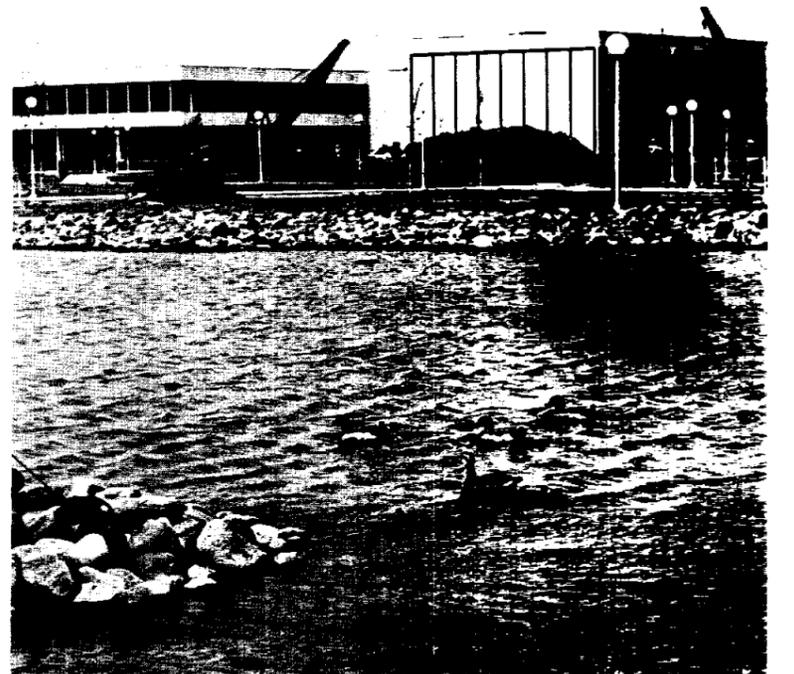
Subsequent flights will carry scientific experi-

ments to photograph zodiacal light, to obtain spectrographic photographs of horizon airglow and the tops of cloud formations around the Earth, and to investigate the ability of the astronaut to recognize objects on Earth with and without magnifying devices.

Later technological experiments include studies of the capability of man to report information on Earth conditions, infrared and ultraviolet measure-

ments, and measurement of possible electricity differentials between two objects in space during docking maneuvers.

The experiments were chosen from almost 100 submitted. These and others that may be submitted are under continuing review for possible use on Gemini flights past number five. No decisions have been made as to which experiments will be flown on the later flights.



ASTRO-DUCK PHASE TWO--Mama duck, her three escorts and six offspring take a "stroll" around the choppy waters of one of the lakes in the center of the Manned Spacecraft Center complex. Eight ducks in the lakes were among the early settlers here at the center. At present time four other ducks are participating in a duck expansion program by sitting on eggs in as many nests.